Tex-217-F, Determining Deleterious Material and Decantation Test for Coarse Aggregates

Overview

Effective date: August 1999 to October 2004

This method provides a procedure for the manual separation of the deleterious material contained in coarse aggregate (Part I) and the determination of fine dust, clay-like particles and/or silt present as a coating in coarse aggregate (Part II).

Part I, Determining Deleterious Material in Coarse Aggregates (Bituminous Mixtures)

Use this procedure to determine the percent by weight of deleterious material in coarse aggregate.

Apparatus

The following apparatus is required:

- balance readable to 0.1 g and accurate to 0.5 g
- drying oven, capable of attaining a minimum temperature of 93 °C (200 °F), or suitable microwave oven
- sample splitter, quartering machine, quartering cloth, or shovel and a smooth surface, as described in Test Method "Tex-200-F, Sieve Analysis of Fine and Coarse Aggregates"
- the following Standard U. S. sieves which meet the requirements of Test Method "Tex-907-K, Verifying the Accuracy of Wire-Cloth Sieves":
  - 9.5 mm (3/8 in.)
  - 4.75 mm (No. 4)
  - 2.00 mm (No. 10)
- dish pan or similar container
- pans, scoops, trowels and other normal laboratory supplies and equipment.

Procedure

Follow these steps to determine deleterious material and decantation test for coarse aggregates.

Determining Deleterious Material and Decantation Test for Coarse Aggregates

Step	Action
1	♦ Obtain a representative sample of aggregate to be tested according to "Tex-221-F, Sampling Aggregate for Bituminous Mixtures, Surface Treatments and Limestone Rock Asphalt." ♦ Select samples of crushed limestone rock asphalt from the processing plant prior to the addition of the flux oil.
2	Dry the aggregate to a constant weight at a minimum temperature of 93 °C (200 °F).
3	Dry limestone rock asphalt aggregates to a constant weight at a maximum temperature of 60 °C (140 °F).
4	Remove sample from oven and allow to cool to room temperature.
5	Obtain a minimum laboratory size sample of 2000 g utilizing the sample splitter, quartering machine, quartering cloth or shoveling method as described in Test Method "Tex-200-F, Sieve Analysis of Fine and Coarse Aggregates." NOTE: When testing aggregates from the hot bins, the sample should consist of aggregates combined in the same proportions used in the mixture being produced.
6	Sieve the dried test sample over the 4.75 mm (No. 4) sieve in such a manner as to avoid breaking up any clay or loam lumps which may be present.
7	Weigh the aggregate particles retained on the 4.75 mm (No. 4) sieve to the nearest 0.1 g.
8	♦ Discard the portion of material passing the 4.75 mm (No. 4) sieve. ♦ Check aggregate samples predominantly of such size as to pass the 4.75 mm (No. 4) sieve for compliance of the deleterious material requirements by testing the material retained on the 2.00 mm (No. 10) sieve, when it is possible to identify the deleterious particles in this small size fraction.
9	Spread the aggregate sample (portion retained on the 4.75 mm [No. 4] or 2.00 mm [No. 10] sieve) out on an area of the work table large enough to carefully examine the individual particles.
10	♦ By visual inspection, separate and classify each type of deleterious matter from the remainder of the sample. ♦ To aid in identification, material may be wetted and/or other suitable methods may be used.
11	Dry and weigh all objectionable material removed from the aggregate sample to the nearest 0.1 g.

Calculations

Calculate the percentage of each or combination of deleterious materials:

$$P = \frac{D}{W} \times 100$$

Where:

- P = Percentage of deleterious matter by weight
- D = Weight of deleterious substances
- W = Weight of total sample (retained on 4.75 mm [No. 4] or 2.00 mm [No. 10]).

Part II, Decantation Test for Coarse Aggregate (Bituminous Mixtures)

This procedure assigns a measurable value to the amount of fine material adhering to the coarse aggregate due to handling or contamination by silt or clay.

Apparatus

The following apparatus is required:

- a balance readable to 0.1 g and accurate to 0.5 g
- drying oven, capable of attaining a minimum temperature of 93 °C (200 °F) or suitable microwave oven
- sample splitter, quartering machine, quartering cloth, or shovel and a smooth surface, as described in Test Method "Tex-200-F, Sieve Analysis of Fine and Coarse Aggregates"
- a mechanical sieve shaker that can impart a vertical, or lateral and vertical, motion to the sieve, causing the particles thereon to bounce and turn so as to present different orientations to the sieving

NOTE: Tyler Rotap, Soiltest model CL-305A and Tyler RX-8 shakers have been found to be acceptable. Others which provide comparable results to these models are also acceptable.

- the following Standard U. S. sieves which meet the requirements of Test Method "Tex-907-K, Verifying the Accuracy of Wire-Cloth Sieves":
  - 9.5 mm (3/8 in.)
  - 4.75 mm (No. 4)
  - 2.00 mm (No. 10)
  - 75 µm (No. 200)
- dish pan or similar container
- pans, scoops, trowels and other normal laboratory supplies and equipment.

Procedure

Follow these steps to perform the decantation test for coarse aggregate (bituminous mixtures).

Decantation Test for Coarse Aggregate (Bituminous Mixtures)	
Step	**Action**
1	♦ Obtain a representative sample of aggregate to be tested according to Test Method "Tex-221-F, Sampling Aggregate for Bituminous Mixtures, Surface Treatments and Limestone Rock Asphalt." ♦ Select the sample of crushed limestone rock asphalt from the processing plant prior to the

Decantation Test for Coarse Aggregate (Bituminous Mixtures)	
Step	**Action**
	addition of the flux oil.
2	Dry the aggregate to constant weight at a minimum temperature of 93 °C (200 °F).
3	Dry limestone rock asphalt aggregates to constant weight at a maximum temperature of 60 °C (140 °F).
4	Remove sample from oven and allow to cool to room temperature.
5	Obtain a minimum laboratory size sample of 1500 g, as described in Test Method "Tex-200-F, Sieve Analysis of Fine and Coarse Aggregates." ♦ When testing aggregates from the hot bins, the sample should consist of aggregates combined in the same proportions used in the mixture being produced.
6	Stack 9.5 mm (3/8 in.) and 4.75 mm (No. 4) sieves on a sieve pan.
7	♦ Place one half the sample on the top sieve, cover the stack, and shake in the shaker for 3 minutes. ♦ Check paving mixtures requiring aggregates that pass the 4.75 mm (No. 4) sieve for compliance by testing the materials retained on the 2.00 mm (No. 10) sieve.
8	♦ Remove any material other than coated particles of aggregate that will slake down during the test. ♦ The material remaining constitutes the decantation test sample.
9	Remove the stack of sieves and empty each into a dry pan, discarding the material passing the 4.75 mm (No. 4) sieve.
10	♦ Discard material passing the 2.00 mm (No. 10) sieve when the 2.00 mm (No. 10) sieve is used in Step 7. ♦ All sieves are emptied into one pan of convenient size.
11	Repeat steps 6 through 10 for the remaining material.
12	♦ Weigh the material retained on the 4.75 mm (No. 4) sieve to the nearest 0.1 g. ♦ Record the weight as B under 'Calculations.'
13	Place the test sample in the dish pan, cover with water, and let soak for 24 hours.
14	♦ Agitate the contents of the pan vigorously with the hands and immediately pour the wash water over the 75 μm (No. 200) sieve. ♦ Agitate vigorously to completely separate all particles finer than the 75 μm (No. 200) sieve from the coarse particles, and to bring the fine material into suspension so it will be removed by decantation.
15	Repeat until the wash water is clear.
16	Return all the material retained on the 75 μm (No. 200) sieve to the washed sample.
17	Dry the washed aggregate to a constant weight as indicated in Step 2.
18	Weigh the dried aggregate to the nearest estimated 0.1 g and record the weight as C under 'Calculations.'

Calculations

Calculate the percent loss by decantation:

$$Percent\ Loss = \frac{B - C}{B} \times 100$$

Where:

- B = original dry weight
- C = dry weight after washing.